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Universities as orchestrators of the development of regional innovation ecosystems in emerging economies

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Abstract

This paper analyses the role of universities as orchestrators of the development of a regional ecosystem that is conducive to innovation and entrepreneurship. We argue that universities in emerging economies, due to many social challenges, must go beyond their missions of teaching, research, and collaboration with industry for innovation. We present a unique case study of an alliance of three universities in Porto Alegre, Brazil that, in addition to being competitors in the above-mentioned missions, are orchestrating a network of stakeholders in this region to develop an ecosystem for innovation and entrepreneurship. We demonstrate that universities perform several orchestration processes that are consistent with the literature, such as fostering knowledge mobility, managing innovation appropriability, and increasing network stability. Furthermore, we found differences in how innovation ecosystems are orchestrated as compared to firm networks. In the case of innovation ecosystems, appropriability reaches the broader region, and the benefits are not limited to participant stakeholders. Such orchestration processes emerge when universities take on leadership positions in the region; they can influence the beginning of collective actions and projects as well as transfer responsibility, delegating power to other actors in the network.

1 | INTRODUCTION

Universities play different roles in their regions; some are well-defined centers of teaching, research, and collaboration with industry for the purpose of innovation (Trippl et al., 2015). However, the role of universities in boosting the broader economic development of regions is not clear (Wakkee et al., 2019). Especially in countries where the public administration lacks funding and resources to enable an innovation ecosystem that drives socio-economic development, other actors, such as universities, may take the lead (Beer et al., 2019; Beer & Clower, 2014). This is particularly true for many emerging economies due to their weak institutions; limited capabilities to design, implement and monitor complex policies; poverty; economic productivity and competitiveness deficits; and corrupt governments, which contribute to needs that go beyond the economic development (Altenburg, 2009; World Bank, 2020). In these contexts, universities can play a place leadership role due to their neutrality, accumulated knowledge, and expertise in relation to different stakeholder groups. However, little is known about universities' practices toward empowering regional ecosystems to develop into environments of dynamic innovation and entrepreneurship (Clauss et al., 2018).

In emerging economies, the nature of formal institutions, the prevalence of customs and traditions over laws, and the motivations of agents involved in innovative activities challenge the knowledge of innovation ecosystems mainly derived from developed countries (Tsvetkova et al., 2017). However, regions in emerging economies require solutions that are often different from those known to work in highly developed regions. Efficient policies from advanced economies should not automatically be considered guides to policy-making processes in emerging economies (Fischer et al., 2018). There is a gap in the current literature relating to how innovation and regional development in emerging economies should best be promoted, and more specifically to what role universities can play in such efforts, to which this paper aims to contribute. We shall especially investigate how universities can act as network orchestrators. As there is an increased focus on the third mission of universities with growing expectations of their impact on broader aspects of societal development, this study will also be able to deliver important policy implications. The main research question pursued in the paper is as follows: how do universities in emerging economies, in this specific case in Brazil, act as regional network orchestrators for the development of an ecosystem that is conducive to innovation and entrepreneurship?

Empirically, we conduct an embedded and longitudinal case study on how universities in the city of Porto Alegre are leading the creation of a regional network to develop an innovation ecosystem. What is novel in this study is the formation of an alliance by three large, locally engaged universities that compete with one another in various activities (teaching and research, applications for funding) but that together are taking on place leadership roles in their region. We believe that a case study of a unique regional collaboration of universities in Porto Alegre, Brazil, will generate new insights into place leadership in emerging economies in general and, specifically, what role universities can play as regional network orchestrators of collective actions targeting innovation and entrepreneurship.

We recognize that innovation systems and ecosystems approaches are devised and mostly applied in highly developed regions and countries, often focusing on high-tech, innovative industries. When applying such concepts in the context of an emerging economy this means that explicit considerations must be taken of the specific context of the studied region to be useful as a policy framework for promoting sustainable and inclusive development to support increased welfare for the entire population. We have attempted to consider this context in the theoretical framework by viewing the innovation ecosystem as a bottom-up approach to foster a learning region (Asheim, 2012) and in the empirical analysis by emphasizing the unique role of the university collaboration as a network orchestrator resulting in a position of place leadership.

Practitioner points

- Policies toward the promotion of regional development in emerging economies should consider universities in place leadership roles to establish and orchestrate ecosystems that are conducive to entrepreneurship and innovation.
- Universities as ecosystem orchestrators can motivate and empower regional stakeholders to reflect and act upon regional development collective needs in bottom-up initiatives to accelerate the resolution of large-scale social problems.
- The paper presents practices that can be employed by universities to orchestrate ecosystems that are conducive to entrepreneurship and innovation.

2 | REGIONAL INNOVATION SYSTEMS AND INNOVATION ECOSYSTEMS

The growth of a region depends on its capacity to generate novel solutions in economic and social realms (Asheim et al., 2019). However, territories are heterogeneous, as are the factors influencing regional innovation (Rodríguez-Pose & Wilkie, 2019). A central argument of the regional innovation system (RIS) approach is the inclusion of localized innovation networks embedded in specific sociocultural settings (Isaksen et al., 2018) because geographical proximity is important for some types of knowledge spillover and for trustful collaboration among actors (Cooke, 2004). Such innovation networks, consisting of a triple helix constellation of industry, university and regional government, are—together with agencies and institutions—the core elements of a RIS, and there is a systemic interdependency among them (Asheim et al., 2019).

Authors such as Moore (1993, 1996) and Adner (2006) have highlighted the "static nature of the innovation systems model" and proposed a more dynamic analytical structure, defined as innovation ecosystems, a concept inspired by biology (Ritala & Almpanopoulou, 2017). An ecosystem describes the evolutionary characteristics of interactions among individuals, their relationship to innovative activities, and their relationships with the environment (Adner, 2017; Adner & Kapoor, 2016; Frenkel & Maital, 2014). By definition, an innovation ecosystem consists of economic agents and economic relations as well as noneconomic elements such as technology, institutions, social interactions, and culture (Mercan & Göktaş, 2011; Oh et al., 2016).

Innovation ecosystems are dynamic structures: rather than being determined by public policies, they evolve according to changes in market conditions (Mercan & Göktaş, 2011) as well as to the initiatives of actors and agencies (Grillitsch & Sotarauta, 2019). The ecosystem is a market-driven phenomenon and is not associated with political issues in the same way as innovation systems are (Adner & Kapoor, 2010; Autio & Thomas, 2014). The foundation of ecosystem thinking can be characterized as expanding an actor's capabilities beyond its own limits and transferring knowledge for the purpose of innovating in collaboration with others (Adner, 2006). In contrast to innovation systems' main focus on organizations and institutions, the ecosystem approach is more bottom-up, explicitly emphasizing the major role of entrepreneurs (Alvedalen & Boschma, 2017). In this study, we expand the traditional focus on economic entrepreneurs to all actors in a region with an entrepreneurial mindset, including economic entrepreneurs, institutional entrepreneurs, and actors and agencies that execute place leadership, in what Grillitsch and Sotarauta (2019) call the "trinity of change agency."

An important aspect in the adoption of this ecosystem concept is the identification of the actors. Based on the triple helix model (Etzkowitz & Leydesdorff, 1997, 2000), which considers the dynamics

of the relationships among industry, government and university to increase innovative performance, Carayannis and Campbell (2009) add a fourth helix, the organized civil society represented by users and nongovernmental organizations, to consider the need to legitimize the actions of the other three actors across society. In this context, the ecosystem includes material resources (funds, equipment, and facilities) and human capital (students, teachers, employees, researchers, and industry employers) that are part of institutional organizations that participate in the ecosystem, which includes universities, engineering faculties, business schools, businesses, venture capitalists (Cohen, 2013), research institutes, centers of excellence, economic development organizations, funding agencies, and policy makers (Samila & Sorenson, 2011).

For the ecosystem to function and for networks to generate collective actions to obtain mutual benefits (in our case, innovation and entrepreneurship), the existence of trust among the actors must be earned through repeated interactions (Asheim, 2012; Morgan, 1997). Some institutions in a region can help in this process by reducing uncertainty, providing information, managing conflict, promoting cooperation, and providing incentives for innovation (Gertler, 2010), which may help to narrow the cognitive distance between key actors in innovation ecosystems (Asheim, 2012). Some of these activities serve system-based strategies that aim to improve the functioning of the system to support the innovation capabilities of an industry, while other activities focus on actor-based strategies to support entrepreneurs and firms' innovation projects (Isaksen et al., 2018). Regional economic change will benefit from a combination of both strategies. In this paper, we will focus on the role of one type of actor, the university, and its engagement as the orchestrator of an innovation ecosystem.

2.1 | Universities in innovation ecosystems

Universities play a number of different roles in the development of regions. The triple helix (Etzkowitz & Leydesdorff, 1997) and the system of innovation approaches not only consider universities to be providers of human capital and of R&D but also value the direct contribution of universities' research in collaboration with industry (Asheim et al., 2019). Some researchers question the impact of universities on regional economic development through collaboration with industry. Lendel and Qian (2017) found that during the Great Recession and the preceding growth period, the educational function of universities—as opposed to business services and the creation of new knowledge and technology—was more relevant for the economic development of American metropolitan regions. Additionally, Motoyama and Mayer (2017) found that universities' research commercialized through spin-offs or technology licenses was insufficient to explain regional development.

Other authors indicate a broader role of universities as they may be involved in regional governance, united with national and regional policy makers, and engaged with the local industry and community to play a developmental role (Charles et al., 2014; Gunasekara, 2006; Pugh et al., 2016). Universities that act developmentally draw on their wider networks and constructively interact with broader regional governance structures to shape future economic development trajectories (Benneworth et al., 2009), which can be related to the concept of place leadership. According to Grillitsch and Sotarauta (2019), multi-actor actions for the purpose of regional development can be initiated and guided by place leaders that pool competencies, powers, and resources to benefit both the actors' individual objectives and the objectives of the region. As Beer et al. (2019) explain, when "policy wisdom" does not reside only at the top, place leadership can organize collective development efforts that can guide the future direction of the region, making it an important determinant of growth at the local level (Beer & Clower, 2014). However, place leaders can also take on an important position in regional development when policy makers and local governments fail to provide resources and support for innovation and

entrepreneurship, which is a common reality in many emerging economies. Place leaders are able to look beyond the short-termism of performance goals (Gibney et al., 2009) to foster the engagement of various stakeholder groups, thus helping those groups to both contribute to and take advantage of regional development and new growth paths.

Leadership for regional economic development is based on trust and cooperation among institutional actors—public, private and community—and not on traditional hierarchical relationships (Stimson et al., 2006). Some locally engaged universities are known for having helped their regions develop new innovation capacity. Nieth (2019) studied coalitions of government, industry, and higher education institutions aiming to promote long-term regional change. She found that these coalitions suffered from sub-optimality due to the short-term interests of the individual actors. Besides the short-term interest of actors, universities' engagement with the ecosystem can also be undermined due to the strong dependence on individuals with particular motivations to engage with the industry or with policy makers (Benneworth & Dahl Fitjar, 2019). In less-developed regions, universities may have a more important role in supporting institution building and governance activities than traditional R&D and university-industry cooperation (Fonseca, 2019). This finding is supported by other research emphasizing that university interaction with regional policy makers can promote learning processes and institution building (Arranguren et al., 2010; Gunasekara, 2006). The creation of a partnership with the intermunicipal agency by the University of Aveiro was based on two territorial development programmes in the period from 2007 to 2020. The driving factors behind this process included the prioritized strategy of the university's regional mission, a positive policy environment as well as the agency of key individuals acting as institutional entrepreneurs in their efforts to develop a partnership (Fonseca, 2019). In yet another article, Radinger-Peer (2019) argues that greater understanding is needed of how universities' strategic capacity to support organic collaborations builds up over time through regional deliberative forums between universities and other partners.

In agreement with these articles, we discuss the role of universities that are concerned with supporting the development of an environment that is conducive to innovation in an emerging economy by building partnerships and developing coalitions as leaders in their localities, executing place leadership. We relate these arguments to the management literature in which we find networks composed of independent and dispersed members that are orchestrated instead of hierarchically managed (Dhanaraj & Parkhe, 2006).

Universities pursue greater interaction with their surroundings in varied forms. They are expected to fulfill their traditional missions of teaching and research and, in addition, to undertake new activities that focus on economic, social, and cultural contributions to regional development. Some of the models explaining universities' contribution are (a) the entrepreneurial university model, where universities take an active role in commercializing knowledge through spin-offs, patents, and licensing (Etzkowitz & Leydesdorff, 2000); (b) the RIS university model, where universities are important knowledge producers that interact with regional actors, leading to systemic innovation; (c) the mode 2 university model, where universities generate knowledge directly applicable to solving societal problems; (d) the engaged university model, which explores broader notions of universities' regional engagement, including social dimensions and governance activities (Thomas & Pugh, 2020; Trippl et al., 2015); and (e) the civic university, where universities generate positive externalities and relationships to support or "anchor" local economic activity (Goddard et al., 2016). Our study goes beyond the previous classifications of universities' regional impacts described above; instead, we analyze the role of universities as place leaders that orchestrate network activities.

2.2 | Network orchestration processes

The term "orchestration" describes collaborative practices for the development, management and coordination of innovation networks without hierarchical authority (Dhanaraj & Parkhe, 2006; Gulati et al., 2000). The orchestration of a network refers to an actor's (intermediary or hub-firm) capacity to influence the evolution of a whole network (Möller et al., 2005), in which coordination is more about enabling leadership than strictly managing activities (Ritala et al., 2009). In bottom-up approaches, the governance of an ecosystem is mainly coordinated in a self-regulating way by the interests of different stakeholders, while in top-down approaches, public policies can intervene to increase the overall benefits spilling over from the ecosystem (Colombo et al., 2019). In either approach to innovation ecosystems, regional policies are more toward creating a context in which productive entrepreneurship and innovation can flourish and less about concerned with increasing a specific indicator of entrepreneurship (Stam, 2015).

Before a network is formed, network composition is an important orchestration function (Batterink et al., 2010) because the network recruitment processes may impact the network's innovation output (Dhanaraj & Parkhe, 2006). During this phase, the orchestrator scans the environment and selects strategic and complementary partners (Thomas et al., 2017).

During network collaboration activities, three processes are related to the orchestrator's role: (a) knowledge mobility, (b) innovation appropriability, and (c) network stability (Dhanaraj & Parkhe, 2006). Knowledge mobility is the ease with which knowledge is shared, acquired, and deployed within the network, facilitating opportunities for members to learn from others (Milwood & Roehl, 2018). Hurmelinna-Laukkanen and Nätti (2012) explain that the facilitation of knowledge mobility affects the achievement of a common community identity. Helping to create trust among the network's participants is a key activity of the hub-firm as it tries to motivate knowledge sharing (Lucas, 2005). Nevertheless, even when there is a high level of trust, knowledge transfer occurs only if the participants have appropriate absorptive capacity (Cohen & Levinthal, 1990). The second subprocess of network orchestration, innovation appropriability, is a condition that governs innovators' abilities to capture profits through patents, copyrights, and trademarks and by minimizing free-riding behaviors or unfair advantages (Dhanaraj & Parkhe, 2006; Milwood & Roehl, 2018). The process of network stability is the dynamic "which aims for a nonnegative growth rate while allowing for entry and exit of network members" (Dhanaraj & Parkhe, 2006, p. 661). The reputation of a hub-firm discourages members from breaking network ties and, therefore, contributes to maintaining stability (Faccin et al., 2020).

To perform the processes of network orchestration, some collaborative practices must be institutionalized among members (Dyer & Singh, 1998), and institutionalization is also a key activity that can be performed by the hub-firm (Faccin et al., 2020). Authors who have discussed orchestrators' activities have focused on firm networks (Hara et al., 2015; Nambisan & Sawhney, 2011), but they have explored neither the spillover effects into the broader regional ecosystem nor the role of the university as a hub-firm. Our research contributes to the literature by filling this knowledge gap as the universities taking the regional lead as a network orchestrator reflects and contributes to the creation of an innovation ecosystem.

Based on the literature review, we propose the theoretical framework that guided our analysis (Figure 1). At the beginning of the process, universities design the network composition. They adopt orchestration practices stemming from the business network orchestration such as knowledge mobility, innovation appropriability, and network dynamic stability. The result of universities' orchestration practices is the promotion of ecosystems that are conducive to innovation and entrepreneurship.

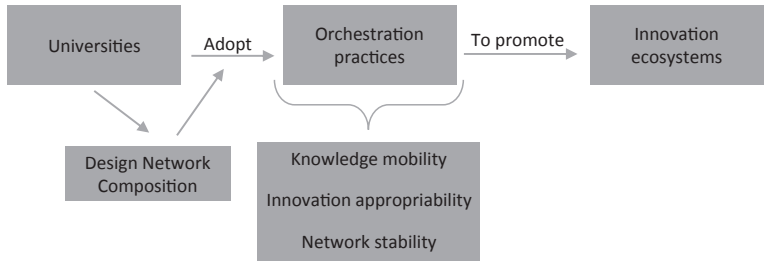

FIGURE 1 Theoretical framework

3 | METHODOLOGICAL APPROACH

To understand the role of universities as network orchestrators of the development of a regional innovation ecosystem, we used a case study approach. We identified a unique and extraordinary initiative (Stake, 1995) in southern Brazil in the city of Porto Alegre. In 2018, the city's main universities—UFRGS (Universidade Federal do Rio Grande do Sul), PUCRS (Pontifical Catholic University of Rio Grande do Sul), and UNISINOS (Universidade do Vale do Rio dos Sinos)—established a partnership called Alliance for Innovation. This alliance aims to engage civil society, business, government, and academia to support a more innovative and internationally recognized city characterized by high impact innovation and a good quality of life for its citizens.

We followed a qualitative research design with interviews, direct observation, and ethnographic (participant observer) techniques to collect data. One of the authors of this article is a professor at a university involved in the initiative. Having an "insider" among the researchers granted us easier access to interviewees and better knowledge of the discussions and activities that occurred throughout the analyzed period. Two of the authors are not employed at any of the institutions and are not involved with the Alliance's activities, which provides impartiality to the study and allows for different perspectives on the events.

We used participant observation from March 2018 to March 2019 to discover "what people do by watching them do it" (Saunders et al., 2009, p. 319). There were more than 3,000 hr of meetings, and we organized a data inventory from material published in newspapers, magazines, blogs, and YouTube channels. The primary data collection was performed in two stages: (a) interviews in October 2018 with 23 actors from the network before the workshops and (b) interviews with key stakeholders after the workshops and the first decisions were made with regard to actions. We had four main groups of interviewees: participants from the universities, from the city government, from the industry (firms, start-ups, technology park, incubators, accelerators, and industry associations), and from organized civil society (Table 1). To ensure confidentiality, each interviewee got a random number in the analysis.

For the data analysis, we used the narrative (Langley, 1999) to introduce the orchestration history, identifying all orchestration practices adopted during the period. The observers' considerations were also included as narratives or in vivo codes. Subsequently, we analyzed the practices pertaining to orchestration concepts. Categories of analysis used as a framework are illustrated in Figure 1 and summarized in Table 2. Due to the nature of the exploratory research, the categories were not strictly fixed: Knowledge mobility, Innovation appropriability, and Network dynamic stability were pre-defined,

TABLE 1 Interviewees

Position and institution	
(*confirmatory stage interviews)	Role in the case/reason for the interview
*Assistant of Mayor—Porto Alegre City Hall	City hall employee working in the Pacto Executive Group
Academic Pro-rector of UNISINOS	One of the founders, working in the coordination of the Alliance
Former manager of Tecnosinos incubator	Experience in TechPark management. Participated in workshops.
POA Inquieta (nongovernmental organization)	Entrepreneur. Participated in workshops
Director of SEBRAE (Brazilian Service to Support Micro and Small Enterprises)	Entrepreneurship support. Participated in workshops
Partner of Mobis Start-up	Entrepreneur.
*PhD student (UFRGS University)	PhD student working in the Pacto Executive Group
*Project Manager—Porto Alegre City Hall	City hall employee working in the Pacto Executive Group
Councilman of Porto Alegre	Politician involved with innovation in the city
*Tecnopuc Manager (Scientific and Technological Park of PUC-RS)	Working in the Pacto Executive Group and in the Communication Group of Alliance
Chairman of Start-ups Association of State of Rio Grande do Sul (AGS)	Entrepreneurship support. Participated in workshops
Senior Researcher—Metroplan	City department of transportation. Participated in workshops
Vice-Mayor of Porto Alegre	Vision of government about the project
Partner of CRP (Private Equity and Venture Capital)	Finance of innovation. Participated in workshops
Tecnopuc Manager (Scientific and Technological Park of PUC-RS University)	Worked in the foundations of two techparks. Participated in workshops
Project Manager—Porto Alegre City Hall	City hall employee working in the Pacto Executive Group
Tecnopuc Manager (Scientific and Technological Park of PUC-RS University)	Innovation and entrepreneurship professor and techpark manager working in the Pacto Executive Group. Leader of the operational team that collects data and perceptions of stakeholders.
*PhD student (PUC-RS University)	PhD Student working in the Pacto Executive Group
Start-up Elefante Letrado (reading platform for children, to develop their reading habits)	Education start-up. Participated in workshops
Chairman of Procempa	IT infrastructure department. Participated in workshops
Innovation Coordinator of Porto Alegre City Hall	City hall employee working in the Pacto Executive Group
Institutional Relations Director of City Hall	Vision of government about the Project
Director of 4All	Digital firms hub. Participated in workshops

derived from the literature on network orchestration. Ecosystem kick-off and Responsibility transfer were defined subsequent to the interviews, and they are part of the originality of this article and contribution to the literature on ecosystem orchestration. During the analysis, we created a timeline (Figure 2) with the main events to facilitate an understanding of the dynamic of the process.

TABLE 2 Theoretical dimensions

Category of analysis	Scope	Literature
Network design to ecosystem kick-off	i) network design/composition ii) scanning the environment to select partners	Dhanaraj and Parkhe (2006) Batterink et al. (2010) Thomas et al. (2017)
Knowledge mobility	i) Knowledge absorption ii) Network identity iii) Interorganizational socialization	Dhanaraj and Parkhe (2006) Milwood and Roehl (2018) Hurmelinna-Laukkanen and Nätti (2012)
Innovation appropriability (value capture)	i) Develop trust among partners ii) Assure procedural justice iii) Promote joint asset ownership	Dhanaraj and Parkhe (2006) Lucas, 2005 Milwood & Roehl, 2018
Network dynamic stability (network maintenance)	i) Improve reputation ii) Increase the shadow of the future iii) Build multiple ties	Dhanaraj and Parkhe (2006) Faccin et al., 2020 Dyer & Singh, 1998
Responsibility transfer	i) delegate responsibility ii) transfer power to actors in the network	Originality of this research

4 | CASE STUDY

4.1 | Context of the Porto Alegre region

The city of Porto Alegre was founded in 1772. It has approximately 1.5 million inhabitants, and the metropolitan region has approximately four million people. Porto Alegre faces a variety of problems that jeopardize its reputation, distancing visitors, and affecting the well-being of its population. The city's urban conditions, historical buildings, and roads are deteriorating, symbolizing a decline felt not only in citizens' daily lives but also in development indicators (Zen et al., 2018).

The three main universities in Porto Alegre are leading the Alliance for Innovation: (a) UFRGS is a public university with more than 30,000 students, founded in 1934. It has a long tradition of triple helix collaboration, with more than 700 groups working with basic or applied research from many different fields. Approximately 14,000 university-affiliated persons are involved in scientific and technological research, including undergraduate and graduate students, laboratory technicians, professors, and visitors. (b) PUCRS began with the arrival of the Marist Brothers in Brazil (religious congregation founded near Lyon, France in 1817). The university celebrated its 70th anniversary in 2018, has more than 28,000 students, 168,000 alumni, and 3,200 faculty and staff members. Additionally, it has one of the main tech parks in Brazil, Tecnopuc, with 136 companies and approximately 7,000 jobs and internships. (c) UNISINOS is a Jesuit university with more than 25,000 students that was founded in 1969. It also has a long tradition of triple helix collaboration, including research and education partnerships with more than 160 agreements around the world. Its technology park includes 75 companies and start-ups that generate 6,000 jobs.

4.2 | Alliance for innovation in the city of Porto Alegre

In 2017, with the mandate of a new mayor in Porto Alegre, a public policy was created to promote the development of the innovation system and entrepreneurship. The innovation council was led by

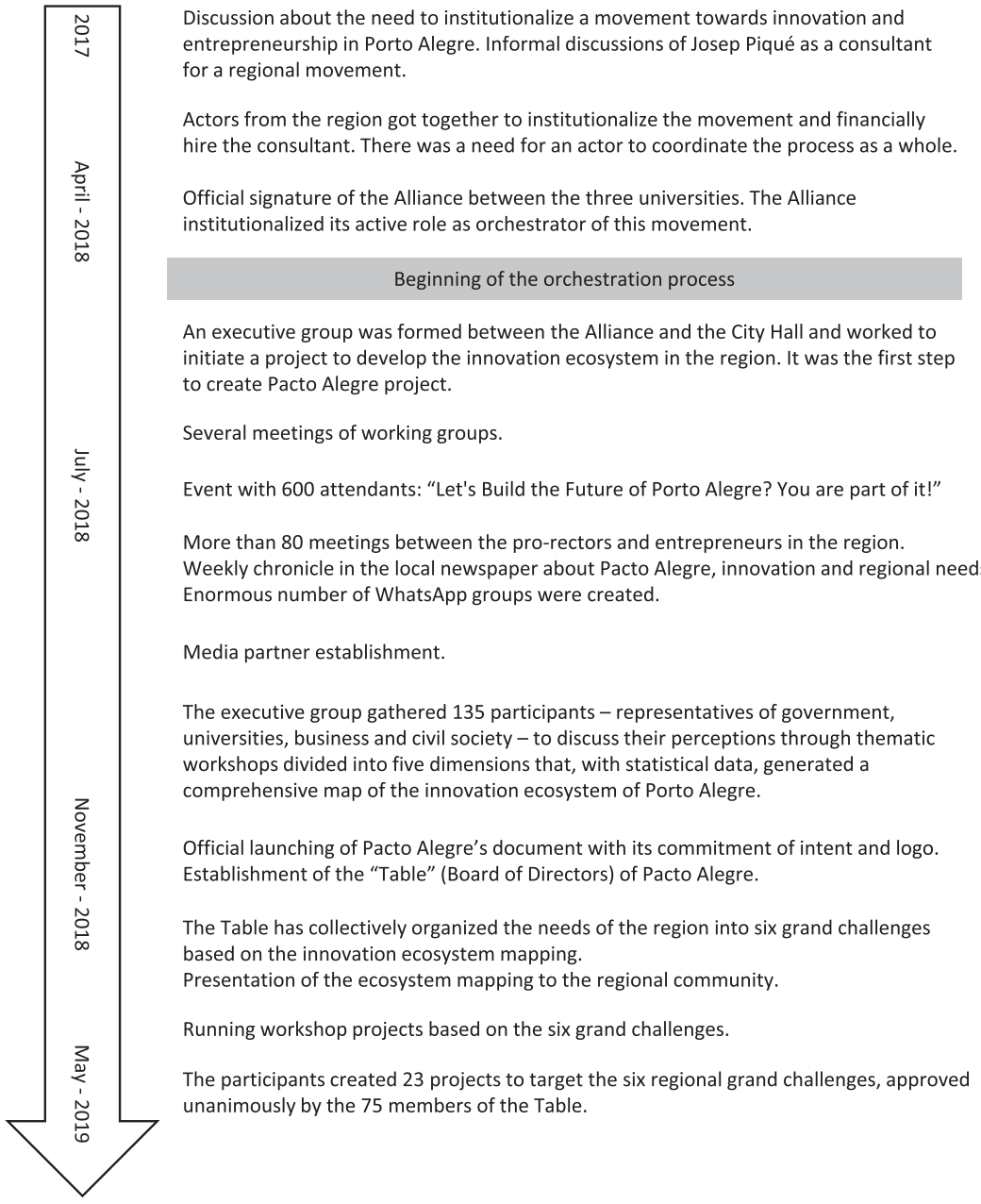

FIGURE 2 Timeline of the case

Jorge Audy, who held the positions of rector of PUCRS, President of the National Association of Entities Promoting Innovative Enterprises (Anprotec), and President of the Latin American Division of the International Association of Science and Technology Parks and Areas of Innovation (IASP). Audy organized a seminar about innovation for regional entrepreneurs with the Spanish professor and consultant Josep M. Piqué, president of the IASP.

After the seminar, Josep Piqué was mentioned in informal conversation as an alternative leader who could potentially institutionalize a movement to foster innovation in Porto Alegre given that he

had been involved in innovation ecosystem development in Barcelona, Medelín, and the Brazilian State of Santa Catarina. At the beginning of 2018, actors who had attended the seminar—together with other actors from the private sector—joined the call to take action to improve the innovation ecosystem. Thus, there was a need for an actor to coordinate the process as a whole.

At the same time, the three largest universities in the region (UFRGS, PUCRS, and UNISINOS) connected and created the Alliance for Innovation. In doing so, the university leadership acted as institutional entrepreneurs by going beyond their traditional roles as rectors. From this moment on, the Alliance institutionalized its active role as orchestrator of this movement. For the universities, joining efforts for this action legitimized them in the community and reinforced their existing initiatives. The rectors involved highlighted that *"the three institutions are strongly linked to knowledge, research, culture, development and social responsibility and [now] we are united for a project that aims to transform Porto Alegre"* (Vieceli, 2018). With the development of Porto Alegre into an innovation ecosystem, the Alliance also aims to reduce the brain drain and improve the quality of life for all citizens (Vieceli, 2018).

4.2.1 | A hands-on alliance: the Pacto Alegre project

A collaborative project, called Pacto Alegre, was established in partnership with the City Hall. The mayor made five people available full-time, and each university had one professor and one student dedicated part-time to the project. The day after the Alliance for Innovation was officially created, a meeting was held with the pro-rectors of the orchestrating universities, the mayor, and 16 members nominated by these institutions. The meeting sought to establish working groups, to assign them responsibilities in the different areas needed to develop the project, and to align expectations with respect to dates and targets for the first 12 months. This group *"has been working hard for 3 months on the Pacto implementation and thinking about how to raise awareness of ecosystem agents […] in a very strategic way, every mission, debate, workshop or communication was well planned, thinking about engagement… as the result"* (I12).

Between July and November 2018, the pro-rectors of the universities held more than 80 meetings with entrepreneurs from the city. They also participated in events to discuss ideas about innovation ecosystems and to present the Alliance's desire to develop Porto Alegre. Additionally, actors involved in the alliance began to write a weekly chronicle for the newspaper, highlighting the importance of the project and the need for innovation in the city (Audi, 2018; Balestrin, 2018; Villwock, 2018). It was during this period that *"a meeting took place at UNISINOS, on a Saturday morning, that called the opinion makers, people who have open channels in the media, influential people… this meeting was very emblematic because there were several testimonials that would become the basis for the construction of what should be done over time. It was really cool… very important… and the network grew really fast" (I4)*. Subsequently, it was very common to find people who said "*because of the Pacto, I became part of a huge number of WhatsApp groups because I met a lot of people in these meetings, a lot of good people, a lot of business opportunity… that is, a cohesive, dispersed and open group that grows daily towards a common goal"* (I12).

Members of the Alliance went on technical visits to other countries, such as the United States and Colombia, to learn about ecosystems that have changed over time, and Josep Piqué was officially hired as a project consultant. Local media declared that the launch of *"Pacto Alegre is an opportunity to create an environment conducive to innovation, culture and quality of life"* (Gonzatto, 2018). Pursuing this goal became possible after the banks Sicredi, Agibank, and Badesul financially secured the project.

During this period, RBS group engaged as an important media partner, performing a series of media functions at no cost, including publicity material as the consolidation of Pacto Alegre brand, a pun on the name of the city, Porto Alegre. The launching of the brand and its use by entities and projects *"promoted the identity of the ecosystem and showed the potential of the initiative"* (I12). Press releases are now launched in conjunction with the communication of the universities and the City Hall, generating a united dissemination of information, and it was found that *"communication is a ballast to solidify the identity of the ecosystem and expand the networks"* (I4).

In July 2018, an event was held that would serve to gauge the city's interest in the project. It was called "Let's Build the Future of Porto Alegre? You are part of it!" The purpose was to share the future vision of Porto Alegre. The event was attended by three rectors, the mayor, several businessmen, Josep Piqué, and representatives of the ecosystem of Santa Catarina, which served as a successful example. This event brought together more than 600 people (Fonseca, 2018). The participants described *"an interesting thing, every event we attend serves to get people involved and engaged"* (I23); "*After each event as this, we receive many messages from various entities asking how they can participate"*. (I21) "*WhatsApp exploded with a large number of good vibes and interests"* (I13); *"Often, they will engage in networks that already exist; many groups of people who were already working in isolation are now gaining strength and becoming part of the network, which is actually the ecosystem… our role is also connecting these various networks and joining efforts*" (I10).

The pro-rectors and representatives of the Alliance worked on sharing information and community involvement. The executive group gathered 135 participants to discuss thematic workshops divided into five dimensions that, with statistical data, generated a comprehensive map of the innovation ecosystem of Porto Alegre (Zen et al., 2018). In addition to these formal groups, "*I must point out the importance of informal groups, like WhatsApp, which have open discussions on topics that culminate in activity and face-to-face meetings… this is fundamental to mobilize knowledge in the ecosystem […] the alliance organizes the most formal mobilization groups, it invites people to workshops, meetings… and the WhatsApp group is responsible for the organic growth of the movement"* (I8).

Following the launch of Pacto Alegre, the first practical results began to emerge. One example was the Caldeira Institute for Innovation, which aims to be a private center with coworking spaces, acceleration support for start-ups, and a funding center for the expansion of companies. Another result was "Start.edu," an initiative to attract start-ups and to seek innovative solutions for municipal schools. These initiatives showed to citizens that some achievements and benefits were occurring in the short-term, giving credibility to the movement.

The next step of the project was the involvement of firms, industry associations, and civil society associations. The presidents of each institution signed agreements offering "something" (resources, consultancy, current projects, knowledge regarding previous initiatives, and labs) toward developing the innovation ecosystem. This collaboration was called the "Table," meaning board of directors. The Table acts as the arena to discuss challenges and actions for developing the regional innovation ecosystem and to advise policy makers. It is composed of 75 institutions: six universities, five other educational institutions, one start-up incubator, five start-ups, 15 large companies, 33 business associations, one nongovernmental institution, and public administration agencies. These institutions have collectively organized regional needs into six grand challenges based on innovation ecosystem mapping: City Identity; Modernization of Public Administration; Talents; Business Environment; Urban Transformation; and Quality of Life (Zen et al., 2018). This diagnosis also gives *"support and credibility for people to engage"* (I4; I12).

The executive group (formed by professors, PhD students, and members of City Hall) invited people from civil society, universities, government, and companies to workshops to plan projects that could develop and improve the innovation ecosystem, organized according to the six macro challenges.

TABLE 3 Orchestration processes by universities

Orchestration processes and tasks (theoretical foundations)	Practices from the Alliance (empirical evidence)	Practices of universities as ecosystem orchestrators
Ecosystem kick-off i) Network design/ composition; ii) Scanning the environment to select partners.	Josep Piqué's speeches for mobilizing regional stakeholders; Mobilization meetings by pro-rectors.	Identify the lack of and the need for a functioning ecosystem; Identify key regional stakeholders; Motivate (convince) participation; Lead the first activities until trust is built among members and they commit to perform further actions.
Knowledge mobility: i) Knowledge absorption ii) Network identity iii) Interorganizational socialization	Mobilization meetings by pro-rectors; Mapping workshops; Event "Let us Build the Future of Porto Alegre?";Josep Piqué's speeches; Missions to other regions and abroad.	Development of formal and informal relationships; Collective definition of common goals.
Innovation appropriability: (value capture) i) Develop trust among partners ii) Assure procedural justice iii) Promote joint asset ownership	Document officializing actors' commitment to participate; Projects' co-creation workshops; Media partner; Aligned communication among universities; Workshops to define actors' joint vision of the future.	Unified communications; Collective definition of value to be created; Collective definition of actions for value creation; Expansion of appropriability to other actors in the region.
Network dynamic stability: (network maintenance) i) Improve reputation ii) Increase the shadow of the future iii) Build multiple ties	Hiring an external consultant; Document official actors' commitment to participate; Co-creation of projects; Voting to approve projects and partners involved in each project.	Repeatedly show the hub firm's reputation; Manage the expectations of network members; Clarify the future benefits network members may access and the overall result for the region; Enhance interorganizational socialization and build multiple ties; Maintain members' motivation.
Transfer responsibility	City hall named people to be involved with the orchestrators (universities) and other stakeholders involved in developing projects; Universities named people to facilitate activities with the network of stakeholders; Each of the 29 projects has one coordinator.	Share decision making with participant members; Delegate responsibility; Follow collective results; Share administrative tasks; Share administrative power.

For the participants in these workshops, *"the ideation meetings made it possible to engage more and more actors in this ecosystem. In Porto Alegre, interests seem quite diverse, but as a single 'entity', Pacto was able to start creating more and more connections" (I4)*. Afterward, the participants created 23 projects to target different challenges. Figure 2 summarizes the main events since the beginning of the case.

5 | DISCUSSION

This research aimed at analyzing the role of universities as orchestrators in the development of a regional innovation ecosystem. On this basis, orchestration processes were identified with the actions occurring within the Alliance initiative (Table 3).

The case study showed that the orchestrators made the necessary push to begin mobilizing actors for networks and projects. The universities played a larger role in ecosystem orchestration compared to what Batterink et al. (2010) refer to as network composition. We, therefore, consider the "ecosystem kick-off" as the first process of ecosystem orchestration, when the orchestrator identifies the regional needs that would justify the creation of a functioning ecosystem. We observed this action in 2017, when the City Hall created the first policy of the current mandate toward innovation and entrepreneurship. However, the region had more needs than simply economic development, and a top-down solution would not entirely address those challenges. Thus, a bottom-up innovation ecosystem framework was recognized as more suitable. To boost collective actions, the orchestrator (university alliance) had to identify key stakeholders and motivate them to become involved, what Thomas et al. (2017) describe as the orchestrator scanning the environment and selecting strategic and complementary partners.

Knowledge mobility, as a process performed by orchestrators, assists in assessing the value of knowledge and in creating mechanisms for knowledge transfer among different network members, thus facilitating learning opportunities (Hurmelinna-Laukkanen & Nätti, 2012; Milwood & Roehl, 2018). At the Alliance, some collective practices generated knowledge mobility results, such as meetings between the pro-rectors and businessmen and entrepreneurs from the region, big events, and workshops for mapping the ecosystem. The mapping workshops had not been planned at the beginning of the Alliance but were necessary to bring network actors together because many of them had never met face-to-face. These events, therefore, were important actions in building trust among the participants.

Orchestrators are also involved in promoting innovation appropriability (Dhanaraj & Parkhe, 2006; Milwood & Roehl, 2018). In the case of the Alliance, some actions were identified with this process such as the document officializing the actors' commitment, a regional media partner unifying external communications from the Alliance members, a document stating the actors' vision for the future, and workshops in which 29 projects were co-created. We found a different outcome when analyzing the ecosystem instead of a network of firms. As the ecosystem is not limited and defined in terms of participant actors, the value created is also not limited to the participant actors. As the results from the creation of an ecosystem are spread across the region, the "innovation appropriability" is collective, generating higher impacts in terms of economic development.

The fourth process of network orchestration is network stability, which concerns maintaining the existence of the network. In the case of the Alliance, hiring an external consultant with experience in the development of innovation ecosystems helped to build the initiative's reputation. Additionally, the document with actors' signatures of commitment discourages actors' attempts to sever their ties with the network. The co-creation of 29 projects in which actors engage in targeting the six macro challenges lengthens "the shadow of the future", which is the "bond between the future benefits a

network member anticipates and its present actions" (Dhanaraj & Parkhe, 2006, p. 664). Considering the actions of the Alliance and the findings in the literature on orchestration processes, maintaining network stability in an ecosystem would include managing the expectations of members because the results of developing an ecosystem can emerge slowly in terms of economic development. At the same time, it is essential to make clear the expected results for the participant members and for the whole region. As a consequence, the orchestrator should enhance interorganizational socialization and build multiple ties so that members stay motivated and committed to working on the projects.

An important finding from the case is the orchestrators' process of delegating and transferring power and responsibility to actors in the network, which has not been referred previously in the literature on network orchestration (see, e.g., Dhanaraj & Parkhe, 2006; Hurmelinna-Laukkanen & Nätti, 2012; Milwood & Roehl, 2018). In the Alliance case, the orchestrators (universities) helped the network to establish 29 projects to target regional grand challenges, and the responsibility for each project was given to a coordinator within the network. The orchestrators are not even involved in all projects. It is also worth noting that, when using responsibility transfer practices, the orchestrators sought to equalize the working groups, bringing actors from the four helices to all discussions and activities.

Based on the findings from the empirical research, we changed the initial theoretical framework to reflect how universities act as regional network orchestrators, serving as place leaders for the development of an innovation ecosystem (Figure 3). Universities initiate the actions to create the ecosystem and adopt orchestration practices that consolidate universities' role as place leaders. The orchestration practices recognized by the network literature (KM, IA, and NS) promote new projects for the ecosystem. Responsibility for the collective actions is transferred to other members of the ecosystem, reflecting the quadruple helix concept that enables the innovation ecosystem development from a combined top-down and bottom-up approach. In the process of orchestrating ecosystems, the university only has the ability to design the "network" at the beginning of the orchestration process, which is the moment when it chooses the initial actors who will participate in the actions. Afterward, it is expected that a great diversity of actors will start engaging and participating in actions to drive the regional development.

6 | CONCLUSIONS AND IMPLICATIONS

One important insight of this case study is the demonstration of the role that universities in emerging economies can play by taking on place leadership functions when orchestrating the establishment of an ecosystem that is conducive to entrepreneurship and innovation. In emerging economies, where trust and social capital are lacking, governments are often corrupt and institutions weak, and businesses are suspected of only pursuing their short-term interests, there is a need for alternative agencies to take a leadership role. As illustrated in this case from Porto Alegre, in alliances with government, universities seem to be the sole actor that can earn trust in the motives behind their actions. Such trust is necessary to mobilize a broad number of various local and regional quadruple helix stakeholders representing a combined top-down and bottom-up approach. This is a finding with great policy implications regarding how to promote the regional development in emerging economies and represents an example of engaged or civic universities (Goddard et al., 2016; Trippl et al., 2015), which so far have only been studied in developed countries. What is particularly novel in this study is that the three universities are explicitly taking on the role of place leadership (Grillitsch & Sotarauta, 2019). Specifying the anchor function of a civic university in the form of place leadership is the first theoretical contribution of this study.

In the region of Porto Alegre, the regional government is seen as a funder, not as an orchestrator, while the university has the characteristics of an orchestrator of the innovation ecosystem. When the government fails (due to a lack of resources, other priorities, and limited timeframes), civil society finds ways to organize itself, and the agent with the competences to lead such collaboration was, in this case, the university. The interviewees' opinions regarding universities' competences to lead the regional innovation ecosystem do not emphasize the universities' educational mission. They mention excellence in research, the reputation of universities as serious and trustworthy organizations, universities' neutral position between government and industry, and long-term commitment.

The study's second contribution to theory regards the concept of innovation appropriability as one of the orchestrator's processes: this concept cannot be applied in the same way when analyzing the orchestration of an innovation ecosystem compared to orchestration of a network of firms. We suggest that there is another level of appropriability—the regional collective appropriability—where the results benefit not only the firms in the network but the larger region around the network. Consequently, appropriability has two different levels: the intra-firm level in a network and the regional collective appropriability at the ecosystem level. Another insight is that the literature employs *network* orchestration as its unit of analysis. We introduce the ecosystem as a unit of analysis, showing that universities can play the role of orchestrators regarding a broader region compared to a network.

We cannot yet analyze the results of this programme in terms of the economic development of the region because the actions are ongoing and fairly new. Nevertheless, we can observe two initial results: first, the scope of the programme engaged many actors who had not previously collaborated. Thus, the new collaborations and the establishment of projects that reflect the development needs of the region are the first results. Second, the projects decided by the "Table" focused on three main areas that are important to the region, which also reflect the development goals for the region: (a) start-up firms, (b) basic education, and (c) improving the local environment (e.g., airport and painted streets). This finding demonstrates that bottom-up initiatives can accelerate the resolution of large-scale economic and social problems in contrast to top-down initiatives from policy makers in emerging economies. Thus, the importance of "mapping the ecosystem's needs" is also an initial result that deserves attention. The case of the Alliance for Innovation reveals important orchestration practices that can be adopted by other universities in different regions. It is noteworthy that the practices employed in the region of Porto Alegre meet regional specificities; for this reason, based on our findings, the meaning of each orchestration practice proposed by Danaraj and Parkhe (2006) was redefined for a better application of the concepts related to innovation ecosystems (Table 3).

As noted above, this study has major implications for the formulation of regional policies toward innovation in emerging economies in general, and especially with respect to the role of universities as regional orchestrators that can take on the role of place leadership. This role can especially help to promote a bottom-up approach in the formation of an innovation ecosystem as a learning region,

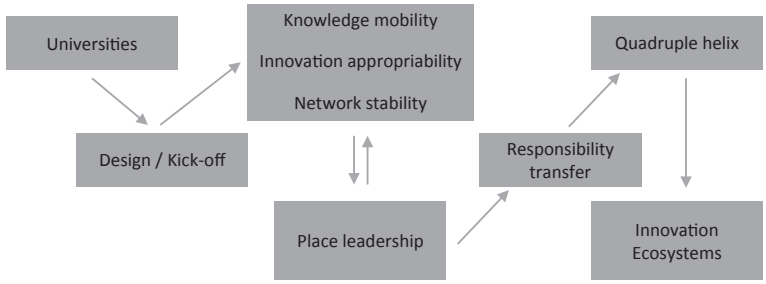

FIGURE 3 Framework of how universities orchestrate innovation ecosystems

which—combined with a top-down approach—can lead to the development of RISs, which can promote regional economic development in regions in emergent economies more efficiently than the previous strategies and policies (Asheim, 2012). For policy learning, it is important to gain specific insight into this question because regional place leadership is context specific. Therefore, broad generalizations are difficult to make and should generally be avoided (Beer & Clower, 2014; Hambleton, 2011). This study, thus, demonstrates that innovation ecosystems as a system approach can be useful in the context of a region in an emerging economy if careful considerations of the specific context of such a region are adequately dealt with in the analysis. This finding further underlines the potential of this approach as a policy framework for promoting an inclusive and sustainable development path.

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